

to create fracture interfaces in the cut composite components. These fracture interfaces may be produced by stamping, at the time of cutting.

5 The treatment process according to the invention which includes a step of producing a layer covering the nanocrystalline strips may be combined with the previous process for producing nanocrystalline strips from amorphous strips.

10 Figure 5 shows a plant for carrying out the first step, of covering with a layer of polymer material, of the treatment according to the invention on nanocrystalline strips leaving the heat treatment furnace for developing nanocrystalline structures in strips of amorphous alloy.

15 Figure 5 shows a heat treatment furnace 22 in an inclined arrangement which may consist, for example, of a quartz tube surrounded by electrical heating means and an inductor allowing, optionally, the strip to be subjected to a magnetic field. Several amorphous
20 strips, for example three strips of amorphous alloy 21a, 21b and 21c, are made to pass through the furnace 22. The amorphous strips 21a, 21b and 21c are subjected to a heat treatment at a temperature of about 550°C inside the furnace 22 for a time sufficient to develop
25 a nanocrystalline structure in these strips. The strips 21a, 21b and 21c are cooled in a cooling unit 23 and then deposited on a movable support band 24. The strips are then covered, on one or both sides, with self-adhering polymer strips precoated with adhesive which
30 are wound in the form of reels, such as 24a and 25a placed in the path of each of the strips such as the strip 21a.

On leaving the plant, three laminated strips are obtained, each consisting of a strip of
35 nanocrystalline alloy covered on one or both of its faces with adherent strips of polymer material.

The laminated strips obtained may be cut in the form of magnetic components or assembled by bonding in order to form composite strips comprising several

superposed laminated strips which may themselves be cut.

Figures 6A, 6B and 6C show examples of components produced by cutting strips made of a laminated composite which are formed by the superposition and consolidation of laminated strips each consisting of a nanocrystalline strip covered with one or two layers of polymer material which adhere to the faces of the nanocrystalline strip. The laminated composite may consist of a plurality of superposed laminated strips linked together, this number of superposed strips possibly being, for example, equal to three or more.

For example, in the case of nanocrystalline strips having a thickness of 20 μm and covered on both their sides with layers of a polymer material having a thickness of 5 μm , a stack of three superposed laminated strips has a thickness of 80 μm , i.e. 0.08 mm.

Of course, it is possible to produce magnetic components by cutting thicker laminated composite strips, for example having a thickness of 1 mm or more.

From such a laminated composite is possible to produce transformer components in the shape of an E, an I or a U, as may be seen in figures 6A, 6B and 6C respectively, showing an E-shaped transformer component 26a, an I-shaped transformer component 26b and a U-shaped component 26c, respectively.

Such transformer components exhibit very good magnetic properties because they consist of layers of a nanocrystalline alloy having very good mechanical properties and because the sheets of nanocrystalline alloy are protected by adherent layers of plastic over their entire surface. Furthermore, as indicated above, there is an extremely reduced risk of the nanocrystalline strips fracturing during cutting of the laminated composite products.

The components as shown in figures 6A, 6B and 6C may be cut by any method of mechanically cutting

shaped components, for example by stamping with a blanking die.

5 The laminated structure of the components obtained is also favorable for limiting the eddy current losses in these components when they are used as transformer components.

It is also possible to use components cut from laminated composites, according to the process of the invention, which can be used as toric cores.

10 As may be seen in figures 7A and 7B, tori may be produced with the shape of cut washers 27a as shown in figure 7A, or the shape of frames 27b with a square or rectangular cross section, hollowed out at their center, as shown in figure 7B.

15 It is also possible, as shown in figure 7C to produce tori with a gap having the shape of laminated washers 27c with a radial slit 27'c constituting a gap. Both the cutting of the washers 27c and the formation of the slot 27'c can be carried out without any risk of
20 fracturing the nanocrystalline strips constituting the laminated composite product. Cut tori are thus obtained which may be of very small dimensions.

In general, the components obtained, such as those shown in figures 6A to 6C and 7A to 7C, may be
25 components with small or very small dimensions and which also have a flat and very thin shape.

It is also possible to produce, using the process of the invention, components for miniaturized magnetic circuits, for example for producing rotors or
30 stators of watches.

It is also possible to produce components for rotors or stators of motors, in particular very small electric motors.

The process according to the invention can also
35 be used to produce anti-theft labels made of a high-permeability material, the presence of which on an article or object can be detected when the object passes through a loop of a circuit through which a current flows. Passage of the object carrying the anti-